AGROTERRORISM

Subject: Science | **Current:** 2010 | **Grade:** 9-12 **Day:** 1 & 2 of 2

1 Purpose

To give the students an appreciation of how agroterrorism can occur in the United States, and how to detect and respond to an agroterrorist attack.

2 Duration

50 minutes

3 Objectives

At the end of the lesson, students should be able to:

- Access websites from both government and non-governmental organization sources to obtain, integrate and apply technical information about agroterrorism and its detection and response.
- Collect clues about animal disease symptoms and suggest possible causative agents.
- Understand the necessary precautions for preventing release of a possible biological agent from a site.

4 Standards & Benchmarks

AGRICULTURE EDUCATION

Landscape Management

Students shall recognize the principles of disease, identify the various diseases responsible for causing damage in the landscape and determine the proper treatment. **LM.A_2**

Students shall recognize the principles of disease, identify the various diseases responsible for causing damage in the landscape and determine the proper treatment. **LM.A_2.2**

Animal Science

Students shall analyze the diseases and parasites that affect animals. **AS.D**

Students shall analyze the diseases and parasites that affect animals. **AS.D.2**

Cite several diseases for swine, sheep, and cattle and apply the principles of proper animal management to the prevention and control of these diseases. **AS.D.3**

Indiana Department of Education. (n.d.). Indiana Standards and Resources: Agriculture Education: Landscape Management and Animal Science. Retrieved from http://dc.doe.in.gov/Standards/AcademicStandards/StandardSearch.aspx

5 Vocabulary

- **Agroterrorism** - The intentional introduction of biologoical agents as a terrorist weapon against the agricultural industries with the intent of producing fear, creating economic loses and undermining the stability of government.
- **Asymptomatic** – Without symptoms.
- **Foot-and-mouth disease** - A highly contagious viral disease that affects sheep, cattle, and swine by producing blisters in the mouth and on the feet in the animals.
- **Pathogen** – Organism which causes disease.
- **Rhinitis** - Commonly known as a runny nose, is the medical term describing irritation and inflammation of some internal areas of the nose.
- **Zoonotic** – A disease which can be transmitted from livestock to humans, and vice-versa.

6 Materials

Computer with internet access.

7 Additional Resources

Additional resources for the lesson:

GAO: "Homeland Security: Much Is Being Done to Protect Agriculture from a Terrorist Attack, but Important Challenges Remain." Washington, DC, March 2005. GAO-05-214.

The direct link to report # GAO-05-214 is:
http://www.gao.gov/new.items/d05214.pdf

8 Procedures & Methods

In this exercise, the students will be provided with a hypothetical situation in which a livestock yard and similar facilities are simultaneously experiencing deliberate contamination. Student groups are to compile information about the disease agent, explain how to handle diseased livestock, and identify the perpetrators of the incident.

All necessary information can be obtained from lecture material and the websites provided.

A. Introduction

'Agroterrorism' is defined as the deliberate introduction of a disease agent, either against

livestock or into the food chain, to weaken socioeconomic stability and/or generate fear.

To date at least five acts of agroterrorism have been documented in the United States and 17 worldwide. More than 80 plant diseases have the potential to threaten U.S. cropland. Agroterrorists could also threaten the U.S. with livestock diseases such as exotic Newcastle disease, foot and mouth disease, anthrax, and swine cholera. If these diseases were to become widespread, it could devastate the entire livestock industry.

A major agroterrorist attack would have major economic repercussions. In addition there may be political fallout from an agroterrorist event, depending on how and when the event is handled. Lastly, an agroterrorism event can cause substantial fear and anxiety among consumers.

B. Development

On the first day the instructor will go over the introduction and the background of the problem and the impacts of agroterrorism. While doing so, the class will take notes. They will also discuss how agroterrorism would impact their community and the larger region (e.g., state, Midwest U.S.), should an attack ever occur there.

C. Practice

On the second day the material on agroterrorism from the previous day will be reviewed. The instructor will give a lecture about the vulnerabilities of the U.S. agricultural sector for agroterrorism and Foot-and-Mouth Disease, and the students will add it to their previous day's notes. The class will then brainstorm recommendations for preventing agroterrorism. The teacher will add to this list recommendations that the students may not have included, which are on the lecture notes.

D. Independent Practice

The students will complete the Agroterrorism activity.

E. Accommodations (Differentiated Instruction)

Students who have visual, mobile or hearing impairments may need adaptive computer software to assist with using the computer and accessing the websites for information during the simulation. Students who are ELL as well as other students who may have developmental issues may need more scaffolding during the simulation to be able to complete it. This could be in the form of additional prompts for each question and a graphic organizer, perhaps a flow chart, to assist them in staying on track and managing the information.

For highly able/gifted students, you may want to make the simulation more abstract, by giving them less structured questions. You may just provide them with the scenario; let them figure out what needs to happen next, where to go for information, and so forth. Check in with them, ask some probing questions, and then give them the updates to the scenario.

F. Checking for Understanding

The agroterrorism activity will be turned in and graded. Rubric is provided below.

G. Closure

Careers in this area include:

Agronomist (science of agricultural crops, particularly grain crops). See: http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREERS

Entomologist (insect scientist). See: http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREERS

Epidemiologist

Plant Pathologist. See: http://www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navtype=MA&navid=CAREERS

Immigrations and Customs Enforcement (ICE). See: http://www.ice.gov/careers/workice.htm

Related websites:

Plum Island Animal Disease Center:
http://www.ars.usda.gov/main/site_main.htm?modecode=19-40-00-00

U.S. Department of Agriculture: www.usda.gov

U.S. Food and Drug Administration: www.fda.gov

U.S. Immigration and Customs Enforcement: www.ice.gov

9 Evaluation

Teacher should rotate among the groups as they complete the terrorism activity.

Teacher should check each group's efforts at this time: Are students on task? Do students clearly understand the scenario? Are students making appropriate decisions? Teacher may intervene when necessary. A rubric for the activity is provided.

10 Teacher Reflection

The teacher will reflect on the results of the lesson after teaching it.

11 Resources & Media

Resources for the lesson:

GAO: "Homeland Security: Much Is Being Done to Protect Agriculture from a Terrorist Attack, but Important Challenges Remain." Washington, DC, March 2005. GAO-05-214. The direct link to report # GAO-05-214 is:

http://www.gao.gov/new.items/d05214.pdf

Plum Island Animal Disease Center:
http://www.ars.usda.gov/main/site_main.htm?modecode=19-40-00-00

U.S. Department of Agriculture:
www.usda.gov

U.S. Food and Drug Administration:
www.fda.gov

U.S. Immigration and Customs Enforcement:
www.ice.gov

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FACT SHEET

The Threat of Agroterrorism

A. Background of the Problem

[1] Terrorism is not something that we generally associate with agriculture or Indiana, but it is not out of the question here. "The threats to and vulnerability of U.S. agriculture are real," says Neville Clark of the Institute for Countermeasures against Agricultural Bio-terrorism.

[1] 'Agroterrorism' may be defined as the deliberate introduction of a disease agent, either against livestock or into the food chain, to weaken socioeconomic stability and/or generate fear.

[1] To date at least five acts of agroterrorism have been documented in the United States and 17 worldwide. In one attack, a radical group released Mediterranean fruit flies in California. The Medfly attacks more than 250 varieties of fruits, nuts and vegetables. A similar attack with a corn or soybean pest could devastate Indiana's agriculture industry.

[1] More than 80 plant diseases have the potential to threaten U.S. cropland. Agroterrorism could affect agriculture either before or after crop harvest. Either scenario would create major disruptions in the food supply.

[1] Agroterrorists could also threaten the U.S. with livestock diseases such as exotic Newcastle disease, foot and mouth disease, anthrax, and swine cholera. If these diseases were to become widespread, it could devastate the entire livestock industry.

B. Impacts of Agroterrorism

[2] A significant agroterrorist attack would have a major economic impact, especially when we include associated industries and services, for example suppliers, transporters, distributors, and restaurant chains. The 'downstream' effect of an agroterrorist attack would drastically affect other sectors of the economy and ultimately impact the consumer.

[2] In addition to economic considerations, a successful bioterrorist act could weaken public confidence in the government. The process of managing an attack—especially the possible need for mass animal slaughter to control a major disease outbreak—would generate public criticism. This was the case during the 2001 foot-and-mouth epidemic in the United Kingdom.

[2] Beyond the immediate economic and political impacts, an attack could also create fear among the public. This would be especially true in the event of a public health scare resulting from foodborne outbreaks or the spread of animal pathogens to humans.

C. Vulnerabilities in the U.S. Agricultural Sector

Vulnerabilities in the agricultural sector occur as a result of many common practices. Examples include:

[2] •Concentrated and intensive farming practices.

Highly crowded breeding and rearing conditions mean an outbreak of a contagious disease would be difficult to contain, especially if it is airborne, and could require the destruction of all exposed livestock.

[2] •Increased susceptibility of livestock to disease.

This phenomenon is a result of changes in animal husbandry practices. These include sterilization programs and hormone injections, and overuse and misuse of antibiotics.

[2] • Insufficient farm/food security.

Farms rarely employ rigorous means to prevent unauthorized access; [2] most animal auctions and barn sales lack organized on-site surveillance. [4] Food processing and packing plants are often devoid of uniform security and safety preparedness measures.

•Inadequate veterinarian training in foreign disease diagnosis.

The number of veterinarians able to recognize and treat foreign livestock diseases is considered to be modest and declining.

C. Foot-and-Mouth Disease

[3] Foot-and-mouth disease (FMD) (Aphtae epizooticae) is a highly contagious and sometimes fatal viral disease of cloven-hoofed animals, including domestic animals such as cattle, sheep, and pigs. It is caused by foot-and-mouth disease virus.

[3] North America, Australia, Japan and Europe have been free of FMD for many years. However, in 2001, a serious outbreak of FMD in the U.K. resulted in the slaughter of many animals.

[3] Foot-and-mouth disease is caused by FMDV, an Aphthovirus of the viral family Picornaviridae.

[5] The incubation period for foot-and-mouth disease virus has a range between 2 and 12 days. The disease is characterized by:

[5] •high fever that declines rapidly after two or three days

[3] •blisters inside the mouth that lead to excessive secretion of stringy or foamy saliva and to drooling

[3] •blisters on the feet that may rupture and cause lameness.

[6] Adult animals may suffer weight loss and in cows, milk production can decline significantly.

[3] Though most animals eventually recover from FMD, the disease can lead to death, especially in newborn animals. Some infected animals remain asymptomatic, but they nonetheless carry FMD and can transmit it to others.

D. Recommendations for Preventing Agroterrorism

[2] Some recommendations over the short- and medium-term include:

[2] •Increasing the number of state and local personnel with the skills to identify and treat exotic foreign animal diseases.

[2] •Standardize the links between the U.S. agricultural and intelligence communities.

[2] •Evaluate surveillance, internal quality control, and emergency response at food processing and packing plants.

[1] The best way to prevent agroterrorist attacks is to be alert. Diligence is the key to preventing and rapidly responding to terrorist threats.

REFERENCES

- [1] http://www.state.sd.us/doa/das/Newsletter%20Spring2003.pdf
- [2] http://www.rand.org/pubs/research_briefs/RB765/index1.html
- [3] http://en.wikipedia.org/wiki/Hoof_and_mouth
- [4] http://www.rand.org/pubs/research_briefs/RB7565/RB7565.pdf
- [5] http://www.absoluteastronomy.com/topics/Foot-and-mouth_disease
- [6] http://www.bio-medicine.org/biology-definition/Foot_and_mouth_disease/

ACTIVITY

Analysis of the Deliberate Introduction of an Infectious Disease

At *Roy's Ranch* in Delaware County, Indiana, six steers and three heifers, penned in the north barn lot, look sick. They were part of a lot of 30 mixed heifers, calves, and steers that were bought from a ranch sale Thursday of last week. The cattle had been transported yesterday from the sale location about 300 miles away. Workers are unsure why they are sick and added that they seemed fine yesterday and again last night when they were unloaded. The entire group of 30 cattle was placed in the same pen last night when unloaded.

A local veterinarian tells Roy's office that he believes this is either infectious bovine rhinotrachetis (IBR) or bovine syncytial virus (BVD). He obtains some fluid specimens that he will send off to the lab for analysis.

In Illinois, the *Acme Stockyards* is conducting business as usual. Cattle are arriving for sale from ranches from several states, some as far away as 500 miles. Workers in *Acme Stockyards* have discovered 14 steer that appear pretty sluggish, with a few having rhinitis. No other sick cattle are reported. One of the old hands tells his manager that something doesn't look right about the cattle in Pen 19. The staff veterinarian is called.

Superior Farms have their primary swine operations center located over 800 miles away from either *Roy's Ranch* or *Acme Stockyards.* The farm manager has just called its veterinarian to take a look at 12 sick hogs in the west confinement barn. The animals, part of a load of about 30 hogs, arrived earlier this morning from one of *Superior Farms*' satellite operations about 120 miles away. The animals appear sluggish and none appears to touch the feed.

[Note: There is no business or personal relationship between the *Superior Farms* and either *Roy's Ranch* or the *Acme Stockyards*.]

Questions to be asked of the students may include:

- Does there appear to be a common link among the three situations described? Describe.
- What issues occur in common?
- What are the probable signs and symptoms which led the veterinarian to suspect these three diseases?
- Using Web sources, briefly describe the two diseases suggested for the cattle at *Roy's Ranch*. Are they contagious for other types of livestock (e.g., swine)? Are they zoonotic (i.e., transferable to humans)?

- What other diseases may have similar symptoms in cattle?
- What actions, in addition to checking on the remainder of the herd, should Roy's Ranch take?
- Does this situation require any additional reporting and/or response actions by other agencies?

There appears to be no direct link among the three sites, yet each site has animals with similar symptoms. The suspicion of foot-and-mouth disease (FMD) is reasonable for each of the three sites. The sites are each in a different state and each state has had vesicular fluid samples sent off to the Plum Island Animal Disease Center (New York) within 24 hours of each other.

- Discuss the apparent coincidence and describe possible causes for the simultaneous occurrences.

FMD is eventually confirmed at the Plum Island Laboratories. It is suspected that the disease may have been intentionally introduced. The FBI is contacted and begins an investigation.

Days later the FBI reports that their investigation is dealing with the transportation of the cattle and swine to the incident sites. The FBI had the transport drivers backtrack their trips for the week preceding the first signs of sick animals. They discovered that the trucks transporting the cattle to the Acme Stockyards and to Roy's Ranch each stopped for fuel at a truck stop at the junction of I-21 and I-68. Their logs reflected that they stopped at about the same time of the day. The truck stop is, incidentally, located about 10 miles from Superior Farms.

The FBI was able to obtain surveillance video tapes from the truck stop that were recorded during the time that the two transport trucks were fueling. On one of the tapes (fuel island), the agents noted that two unidentified individuals approached each of the trailers where it appeared they sprayed something. This took approximately 30 seconds only. The tape also recorded the unidentified individuals getting into a van. A tape from a second camera was reviewed. The second camera was aimed to record vehicle license plates leaving the pumps. The FBI agents ran the license number through a tracking system and the vehicle was not reported as stolen. A vehicle registration record was also run on the license and provided leads for potential owner. Further investigation revealed the vehicle was purchased from a used car dealership; neighborhood interviews identified a residence associated with the vehicle, and descriptions of the residents who matched those from the videotapes.

Municipal law enforcement officials were able to obtain multiple identifications used by the residents and FBI agents were able to link two of these identifications to Immigrations and Customs Enforcement (ICE) documents in which the individuals had entered the United States through Mexico.

- Based on a confirmation of FMD, what steps should now be implemented at the local and at the state level?

RUBRIC FOR ASSESSING LEARNING OUTCOMES

Activity in Agroterrorism

In reference to this course, *the student demonstrates*...

Learning Outcome	Unsatisfactory (0-2) Evidence that the student has mastered this objective is not provided, unconvincing, or very incomplete	Marginal (3-4) Evidence that the student has mastered this objective is weak or incomplete. Isolated facts are provided but not effectively integrated.	Satisfactory (5-6) Evidence shows that the student has generally attained this objective. All major elements are incorporated.	Accomplished (7-8) Evidence indicates that the student has a solid mastery of this outcome.	Exemplary (9-10) Evidence demonstrates that the student has mastered this objective at a high level
Effective use of critical thinking skills					
Understanding of systems thinking and its application					
Proficiency in working collaboratively with others					

Total Points Earned: _____